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ABSTRACT

The role of self-regulated learning in successful academic performance at the college level was studied. Using a literature review, items were developed for a self-regulated learning questionnaire, which was written as a Likert scale and pilot tested with a small group. Subjects for the study were 39 male and 121 female education majors at a medium size midwestern university. Results provide some evidence that leads to the conclusions that self-regulated learning is an important component in academic success, and that it can be measured with some degree of validity and reliability through this self-report instrument. Results indicate a significant relationship between self-regulated learning and grade point average. Many students could profit by instruction that emphasizes the understanding and use of the component skills and attitudes of self-regulated learning. Four tables present study findings. Appendix A summarizes the dimensions of self-regulated learning and contains one figure. Appendix B presents the inventory, which contains metacognitive, learning strategy, motivational, contextual sensitivity, environmental control, and epistemological beliefs items. (Contains 27 references.) (SLD)

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Teaching Self-Regulated Learning Strategies

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Teaching Self-Regulated Learning Strategies

Learning is a complex process, one which many students, despite years of schooling, still find mysterious (Thomas & Rohwer, 1986). What distinguishes the successful student from his/her less successful peers? A growing body of literature supports the notion that optimal academic performance is strongly tied to the degree of self-regulation the learner is capable of exercising (Borkowski, et. al., 1990; Jones & Idol, 1990; Zimmerman & Pons, 1986; Zimmerman, 1990). Although the self-regulated learning perspective is not, from a theoretical position, a unified one, according to Zimmerman (1990, p.4), "a common conceptualization of these students has emerged as metacognitively, motivationally and behaviorally active participants in their own learning." In other words, self-regulated learners are purposive and goal oriented (proactive rather than simply reactive), incorporating and applying a variety of strategic behaviors designed to optimize their academic performance.

While many students, barring those who are totally tuned out, are, to varying degrees, active in the manner just described, self-regulated learners appear to be both more keenly aware of the relation between specific behaviors and academic success and more likely to systematically and appropriately employ such behaviors (Zimmerman & Pons, 1986). They also exhibit greater flexibility in adapting to the variable and sometimes uncertain demands that exist in the classroom, particularly at the high school and college levels. Nevertheless, the component skills that comprise self-regulated learning need not, in our opinion, be viewed as either exotic or as something above and beyond "the basics." They are in all likelihood *the* basic skills that underlie all forms of successful learning (Resnick & Klopfer, 1989). In any event, given the degree of success that self-regulated learners have been reported to enjoy, it follows that understanding the behaviors and processes that underlie self-regulated learning, as well as designing instruction in ways likely to facilitate self-regulation of the learning process, represent important goals for educational researchers and designers.

Our own research, at this juncture, has not been primarily theoretically motivated. However, after reviewing the literature surrounding this topic, we found it useful (and to some extent, necessary) to impose an organizational structure, in the form of a model, on the various and tangled dimensions of self-regulated learning as reported. Our working model of self-regulated learning presently consists of six dimensions: **Epistemological Beliefs**, **Metacognition**, **Learning Strategies**, **Motivation/Self-Efficacy**, **Contextual Sensitivity** and **Environmental Utilization/Control** (see Appendix A for a more detailed description). Most of the various self-regulated strategies reported in the literature (for example, see Pintrich, Smith & McKeachie, 1989; Weinstein, Zimmerman & Palmer, 1988; Zimmerman and Martinez-Pons, 1986) fall into one or another of the categories we have constructed. Contextual sensitivity, we should note, although implicit in much of the published literature, is not an area typically identified explicitly as an independent aspect of self-regulated learning. However, the theme that cognitive processes are contextually bound, or "situated" (Brown, Collins & Duguid, 1989; Jenkins, 1974; Rogoff & Lave, 1984) is becoming increasingly general in the contemporary literature on learning and cognition, particularly as it occurs in educational settings. We therefore decided to define it as a separate dimension in our working model of self-regulated learning.

In brief, in developing our model, we reasoned, following Zimmerman (1990), that the self-regulated learner must be able to both internally regulate, monitor, evaluate and modify, when necessary, the learning process, and be alert to and utilize or manage contextual (external) factors such as course and instructor demands, where and when to study, who, when and where to go for assistance, etc. Self-regulated learners are possessed of a belief system that views knowledge as complex and evolving, rather than simple and fixed, and the knower as capable of self-modification. It is also evident that motivational factors mediate the utilization of both cognitive and environmental resources (Borkowski, Carr, Rellinger & Pressley, 1990). Individuals high in self-efficacy, for example, are

more likely to use cognitive and metacognitive strategies and to seek appropriate (instrumental) forms of assistance when needed (Karabenick & Knapp, 1991; Schunk, 1991). At the same time, there is a positive relationship between a sense of personal control over learning outcomes and subsequent motivation (Dweck, 1989; Schunk, 1991) to undertake learning-related challenges. Despite the many elements that enter into it, there is, as we shall see, reason to believe that self-regulated learning is a unified process which involves the integration of appropriate beliefs and utilization of cognitive, metacognitive, motivational, perceptual and environmental components in the successful resolution of academic tasks.

Having devised a working model of self-regulated learning, we set out to determine if, and to what extent, self-regulated learning (thus defined) plays a significant role in successful academic performance at the college level. We chose to do this by employing a self-report inventory, of our own design, composed of the subscales consistent with our working model discussed previously. We opted to develop such an instrument because to our knowledge no instrument of its kind existed, and we believed that such an instrument could prove valuable as a research tool and would be more efficient and cost-effective than interviewing.

This paper describes the development of our questionnaire, methods used in collecting data, results of the data analysis, and then discusses the degree which a construct as complex and multi-faceted as self-regulated learning can be measured using a self-report inventory. In addition, the paper discusses some implications of our working model for instruction and teaching self-regulated learning strategies.

Method

Development of the Self-Regulated Learning Inventory

Our first step in the creation of a self-regulated learning inventory involved the generation of an item pool. We decided to review the literature and to construct our items on the basis of findings that reported strong relationships between learner-generated activities and academic success. We then reviewed and analyzed the items eliminating those that were too much alike and rewriting those that were either too complex or too vague. This left us with a pool of seventy-one items all of which were included in our first instrument. Although the items represented each of the subscales of our working model discussed previously, we decided to present them randomly as a single questionnaire. A five point Likert scale format was chosen as most appropriate for this type of instrument.

The instrument included representative items from each of the subscales except the epistemological beliefs subscale. Our first conceptualization of the model did not include the epistemological beliefs dimension, thus we only wrote items for the other five subscales. After analyzing the data presented in this paper, however, we revised the instrument and included 15 items representing the epistemological beliefs dimension. Most of these items were obtained from Schommer's (1990) work in assessing student's beliefs about the nature of knowledge. Appendix B shows sample items from each of the subscales, including items from the epistemological beliefs subscale which we added in the revised version of the instrument following the data analysis of this study. The data analyzed in the following sections of this paper, however, only include data collected with the first version of the instrument, which did not include epistemological beliefs items.

A pilot run was conducted to see if directions were clear and sufficient, how long it took to respond to the inventory and if the items as written were clear and comprehensible. As a result, a formal set of instructions was composed. It was determined that time to complete the inventory ranged from 20-30 minutes.

Subjects

Our subjects were all students enrolled in classes in the college of education at a medium size mid-Western university. Unfortunately, the majority of education majors continue to be female. Thus, our sample contains an imbalance in terms of males (39) and females (121). In terms of ethnic composition, 145 of our subjects were European American (White), 10 were African American (Black), two were Hispanic American and three were Asian American. With respect to class standing, 51 were sophomores, 58 were juniors, and 35 were seniors. Our sample also included 14 graduate students and two non-degree students. The mean age of our subjects was 22.8 years. In total, the inventory was responded to by 166 students. Only 160 cases were actually analyzed due to the failure of some students to properly report requested information and/or respond to items.

Procedure

The inventories were administered in every instance by one or the other of the authors. Having obtained prior permission from class instructors, we passed out the inventories and read a prepared set of instructions. Classes ranged in size from thirty to ten. Although participation was entirely voluntary, no student refused to fill out the inventory.

Results

We first report on findings that relate to the technical properties of the inventory. Table 1 shows the result of an analysis of internal reliability of the five subscales discussed previously (MC represents the Metacognition Scale, LS represents the Learning Strategies Scale, MO represents the Motivation/Self-Efficacy Scale, CS represents the Contextual Sensitivity Scale, and EC represents the Environmental Utilization/control Scale).

We are encouraged by these results, although by no means satisfied. An analysis of test-retest reliability, with an eight week delay between times of testing, revealed a correlation of .78, a result we also take to be encouraging.

Table 1

Reliability Coefficients (Cronbach's Alpha)

	MC	LS	MO	CS	EC
Alpha	.77	.83	.77	.64	.79

Our evidence with respect to validity at this point is mixed. That is, our items were constructed on the basis of findings in the literature related to the construct we set out to measure. An analysis of the correlation between scores on the inventory and GPA, our measure of academic achievement, revealed a significant correlation both for the inventory as a whole (represented as SRLTOT) and for each of the subscales (see Table 2). This result corresponds to findings as reported in the supporting literature and provides evidence of concurrent validity.

Table 2

GPA and Scores on the Inventory

	MC	LS	MO	CS	EC	SRLTOT
Correlation	.41**	.47**	.48**	.31*	.39**	.54**

* p <.01, ** p <.001

The result of a factor analysis revealed that two factors account for the largest percentage (30.4) of the variance. A general factor represented by items from every subscale (in all, 52 of the 71 items) which we labelled self-regulated learning and a self-efficacy factor represented by 13 of the 15 items from that subscale. These two items, as noted, account for the main portion of the variance. The fact that a single factor loads highest is in line with the findings of Zimmerman & Martinez-Pons (1988). However, a number (18) of other factors, small but statistically significant, also appeared. While this complicates our ability to draw clear-cut conclusions with respect to construct validity, we found some of these factors to be suggestive in terms of potential areas of inquiry requiring further investigation. For example, it would appear that some students are instructor-based learners while others are text-based learners. It would also appear that further work on the inventory will need to be undertaken to insure that its items represent fewer, and more distinct factors.

As noted, we selected student GPA as our measure of academic achievement. While scores on the inventory subscales in each case correlate significantly with GPA, the largest correlation obtained (see Table 2) was between GPA and total score (SRLTOT). Analysis of the data with respect to the variables of class, age, and sex revealed significant correlations between both sex (.19 p< .01) and age (.31 p<.001) and total score on the inventory (see Table 3). The correlation between class and score on the metacognitive subscale was also significant (.21 p< .01).

Table 3

Correlation Coefficients

	Class	Sex	Age
MC	.21*	.05	.28**
LS	.07	.21*	.26**
MO	.12	.19*	.26**
CS	.01	.12	.09
EC	.08	.12	.28**
SRLTOT	.13	.19*	.31**

* p< .01, ** p< .001

Table 4 shows the mean scores for males and females on the inventory and its subscales. The maximum score possible for the total inventory was 355, which reports the highest degree of usage of self-regulated learning strategies. The minimum score possible was 71. The maximum and minimum scores for each subscale, respectively, are as follows: MC: 85 and 17; LS: 90 and 18; MO: 75 and 15; CS: 50 and 10; and EC: 55 and 11.

It can be seen that females outscore males on total score as well as all subscales but metacognition. While these differences are, in most instances, statistically significant, we hesitate in drawing any firm conclusions due to the small number of males in our sample. We also found, as noted, a significant correlation (.31, $p<.001$) between age and total score. Older subjects tended to score higher. This result is, in part, due to the fact that the graduate students in our sample, though few in number, generally scored higher (M = 268.1) on the inventory than other groups (overall M = 247.9). The fact that only metacognition showed a significant correlation with class is somewhat misleading. That is, although there were only 14 graduate students in our sample, their mean age was 32 (mean age overall being only 23). Thus the graduate students were both the highest scorers and the oldest students.

Table 4

Sex X Inventory Score (mean scores)

	MC	LS	MO	CS	EC	SRLTOT
MALE	57.2	61.2	51.4	34.4	35.1	239.3
FEMALE	57.8	65.4	54.6	36.2	36.6	250.6

N for Male= 39
N for Female= 121

Discussion and Implications for Teaching Self-Regulated Learning Strategies

Results of the Inventory

The results provide some degree of evidence which lead us to conclude both that self-regulated learning is an important component in academic success and that it can be measured with some degree of validity and reliability via a self-report instrument. The results of our data analysis indicate a significant relationship exists between self-regulated learning and GPA. This result is in line with published research on self-regulated learning (Zimmerman & Martinez-Pons, 1986; 1988; Zimmerman, 1990). Encouraging as these results may be, however, we also note that although total score on the inventory and GPA did reveal a highly significant correlation, there arose some problems with the use of GPA as a criterion. For example, some students, although not scoring high in terms of self-regulation, appear nevertheless to maintain a high GPA by either avoiding or dropping difficult courses. Hence their scores may actually have served to lower the degree of relationship. Unfortunately, we were unable to obtain sufficient information to allow us to determine which students actually dropped which and how many courses. We plan to gather this information in a follow-up study. It should be noted as well, that

although the correlation between score on the inventory and GPA was found to be highly significant, much of the variance in student performance is left unexplained.

The fact that total score showed the highest correlation with performance is in line with the work of Zimmerman & Martinez-Pons (1988), who also found that self-regulated learning treated as a single, overarching factor, showed the strongest correlation with achievement. However, factor analysis of the data suggests that degree of self-regulated learning may be mediated by "learning style" factors not yet clearly understood. The fact that graduate students score highest suggests the greater presence of self-regulated learning in this population. While this is not entirely surprising, the small number of graduate students in our sample makes this finding suggestive only. In general, it can be concluded that self-regulation is a significant element in successful college student performance and that many students could profit by forms of instruction that emphasize and promote both the understanding and use of the component skills and attitudes of which self-regulated learning is comprised.

Implications for Instruction

Our research, as well as the research of a number of others (Borkowski, et. al., 1990; Jones & Idol, 1990; Zimmerman & Pons, 1986) lends support to the claim that self-regulatory skills are important components of successful academic performance. An important question is: what, if any, implications do such findings have for instruction? Before addressing this question, we would like to underscore the importance of the issue by noting that classroom instruction, even at the university level, may not only fail to promote self-regulated learning, but actually suppress it (McCaslin & Good, 1992; Farnham-Diggory, 1990). While self-regulation is important for superior academic performance, academic conditions do not necessarily promote either the use or development of this ability. Having said this, we think at least two implications can be drawn.

First, the fact that self-regulated learning plays a crucial role in academic success indicates that teachers need to assess and take into account this dimension of the learning process when considering the classroom performance of particular students. Academic difficulty may be less a matter of ability than a failure of students to (know how to) take control of the learning process to a sufficient degree. More specifically, the problem may lie in one or several areas directly tied to self-regulation of the learning process. For example, lack of metacognitive awareness and self-monitoring may lead to failure to apply the skills the learner possesses under conditions where they clearly apply (Schunk, 1991). On the other hand, the learner may fail to acquire an understanding of the connection between specific learning tactics and specific learning situations and outcomes (Pressley, et. al., 1990). Some learners may interpret challenging classroom tasks as potential sources of negative evaluation of their competence, hence fail to apply the knowledge and skills they possess (Dweck, 1989). To overcome such deficiencies, it is necessary that learners be provided with information which ties strategy use to specific learning outcomes (Pressley, et. al., 1990). Such information is also likely to provide feedback which links learning outcomes to specific student generated activities, a fact which is known to affect self-efficacy attributions (Schunk, 1991).

A significant contribution of our working model is that it illustrates the comprehensive nature of self-regulated learning and the importance of the critical relationships among its components. With a comprehensive understanding of the different dimensions of self-regulated learning, teachers can assess the particular areas in which students may be deficient and help to remediate these weaknesses. For example, a teacher may assess that a student has excellent metacognitive strategies, such as reflecting and self-monitoring, and also a good repertoire of learning strategies. However, if the student believes that the ability to learn is innate rather than acquired, he/she may choose not to engage in a learning situation because he/she doesn't believe that he/she can acquire the required ability to solve the learning problem, thus never using his

or her excellent cognitive strategies. Such relationships and interactions are not identified in many of the traditional study skills models, courses or programs.

Second, it may be necessary, particularly when self-regulatory skills are found to be lacking, to develop instruction specifically aimed to counteract this deficiency. In fact, we believe that since self-regulation empowers students, it should always be a component of the curriculum. In this regard, our thinking is in line with an instructional approach referred to as cognitive apprenticeship (Rogoff, 1990). As Rogoff (1990, p.39) notes, cognitive apprenticeship occurs when "active novices advance their skills and understanding through participation with more skilled partners in culturally organized activities." Cognitive apprenticeship is, in other words, a form of socially mediated instruction wherein (1) to-be-learned skills are modeled by a more experienced "expert" [adult or peer], (2) made explicit by the "expert" through think-aloud demonstrations in the application and regulation of the component skills and (3) over the course of learning the "novice" is induced to accept increasing responsibility for his/her performance of the target skill (Englert & Raphael, 1989). Also crucial to the cognitive apprenticeship model is the notion that socially mediated learning is most effective when occurring within the "zone of proximal development" (Rogoff, 1990). That is, such instruction attempts to enter a student's optimal region of sensitivity to social guidance in order to facilitate cognitive growth. In order to accomplish this goal, one needs to assess the learner's readiness to benefit from a particular instructional intervention. Assessing the ability to self-regulate the learning process would appear, to us, to be an important qualifying criterion.

Our inventory could be used as a diagnostic tool to identify the specific areas in which students have difficulty in self-regulating the learning process. The information provided by the inventory could be used by a teacher as a basis for planning or developing individual instructional prescriptions for both remediation and enrichment. In addition, such information could be valuable for determining the degree to which a particular learner is prepared to benefit from self-instructional materials, including many forms of computer-based instruction. Many students who flunk or never complete a self-instructional course or program fail because they lack the necessary ability to self-regulate the learning process. Perhaps one approach for reducing the failure rate of self-instructional courses or programs would be to administer the instrument to students before taking the course and then adjusting the program or advise students in accordance with performance on the inventory.

Many models for the design of instruction advocate the assessment of the learner's entry behaviors and learner characteristics. However, many of these models only advocate assessing the domain-related knowledge which the learner brings to the learning task. Our working model suggests that educators and instructional designers should not only assess the learner's knowledge base and skills, but should also assess information about the student's epistemological beliefs, motivational level, use of metacognitive and learning strategies, level of contextual sensitivity, and ability to control and utilize his or her learning environment. Given the fact that students enter the learning process at varying degrees of self-regulation suggests that, ideally, a variety of instructional options should be developed to suit the needs of different types of learners.

The Role of Interactive Videodisc-Based Technologies

Considering the evidence that self-regulated learning is an important component in academic success, the next logic question is: What is the best way to teach these higher-order, complex, thinking strategies and skills? Stated more specifically, what are the most effective instructional strategies for promoting both the understanding and consistent use of self-regulated learning strategies?

We propose that an effective and efficient means of tackling the problem involves the creative and resourceful use of interactive videodisc-based technology along the lines of the "anchored instruction" strategy of the Cognition and Technology Group at

Vanderbilt University (Cognition & Technology Group at Vanderbilt, 1990). The basic premise of what the Vanderbilt group refers to as anchored instruction is that learning is most natural and most viable when it is "situated" in realistic environments that permit "sustained exploration by students and teachers and enable them to understand the kinds of problems and opportunities that experts in various areas encounter and the knowledge that these experts use as tools" (p. 3). They (drawing upon the recent work of Allan Collins and John Seely Brown [Brown, Collins & Duguid, 1989], who have been instrumental in advancing the ideas of situated cognition and cognitive apprenticeships) argue that situated cognition provides a broad, useful framework that emphasizes the importance of focusing on everyday cognition, authentic tasks, and the value of in-context apprenticeship training. As Brown, et.al. (1989) have noted, natural learning proceeds most effectively in the context of authentic (rooted in the realistic practices that prevail in a particular culture) tasks. However, given the structure of our contemporary educational system, authentic contexts of apprenticeship for the acquisition of the complex intellectual skills necessary for success in higher education are difficult to create in a cost-effective and efficient manner. Clever use of interactive videodisc-based technology, however, may provide the key for making preparatory educational experiences more authentic.

According to the Vanderbilt group (Cognition & Technology Group at Vanderbilt, 1990), anchoring instruction in videodisc-based problem solving environments has several distinct advantages. First and foremost, it makes the "idea of transforming school instruction into apprenticeships more feasible" (p. 8). It is, in other words, more realistic to ground (anchor) problem solving-based instruction in the simulated reality of a videodisc than to place classes full of students into authentic, real world conditions that require problem solving (e.g., planning, navigating and undertaking a journey by boat, etc.). Videodisc-based contexts also have the advantage of compressing what would take days, perhaps weeks and months in the real world, into minutes and hours in the classroom, as well as making it possible for students to revisit event segments and test their memories against actual aspects of events, something not generally possible in real life. In short, employing videodisc technology holds the potential for making classroom learning more authentic and apprentice like.

The Cognition and Technology Group at Vanderbilt (1990) have, to date, employed the notion of anchored instruction within two key projects. Preliminary findings show very positive results indicating that students so instructed are more likely to employ higher-order thinking than comparison groups receiving more traditional forms of instruction. However, the Vanderbilt group has focused largely on elementary school age children and problem solving skills that might best be characterized as deductive in nature.

Our own interest lies with older, college-age students. Furthermore, the kinds of higher-order thinking skills we wish to facilitate are best characterized as self-regulatory skills. Nevertheless, we believe that the anchored instruction approach using interactive videodisc-based technology is a very promising, viable approach for promoting self-regulated learning strategies.

Design Considerations of Teaching Self-Regulated Learning Strategies

We are currently in the process of designing instruction (using interactive videodisc-based technologies) for promoting self-regulated learning strategies in college students. As a part of this effort, we are conducting a study to determine the most appropriate and effective instructional strategy (or strategies) for teaching these higher-order thinking skills. The instructional strategy, or strategies, best suited to promote a more general acquisition of such skills remains largely an empirical question. Three such strategies can be identified in the literature: the stand-alone strategy, the embedding strategy and the immersion strategy (Ennis, 1989; Prawat, 1991).

The stand-alone strategy assumes that there exists a set of general, content independent cognitive skills, which can and should be taught as such (Feuerstein, 1980). It is, say its proponents, up to the educational community to make room in the curriculum for such instruction. Critics charge, however, that explicitly taught generic thinking skills typically fail to transfer either across the curriculum or to the work place (Larkin, 1989). The embedding strategy is built on the premise that higher-order thinking skills are best taught explicitly as an integral component of content-based instruction (Beyer, 1987; Ennis, 1989). Those who prefer an embedding strategy also assume that thinking skills are, to a significant extent, context bound. From this perspective, the contemporary curriculum need only be slightly modified in order to incorporate instruction that emphasizes the how of learning as much as the what of learning. To critics, however, the feasibility of embedding an emphasis on higher level thinking skills at no cost to the standard curriculum appears questionable (Prawat, 1991). Furthermore, just as with the stand-alone strategy, the problem of cross-content transfer also plagues the embedding approach.

A third, less common and less well-defined approach to promoting the development of higher level thinking is represented by the immersion approach. Essentially, those who promote an immersion strategy argue that higher level thinking will emerge naturally when students' own ideas are taken seriously, and as they are immersed in the main ideas and issues that define a particular field of study (Prawat, 1991). The immersion approach is a content first strategy. However, the emphasis is more on the importance of ideas as tools for unlocking content rather than on either the content per se, or the cognitive processes (independently construed) applied to that content. Importantly, it is thought by its proponents that cross content transfer of the thinking skills emerging out of students' confronting the main ideas that drive a discipline is more likely with the immersion approach because they arise implicitly and naturally (rather than explicitly and artificially) in the process.

It can be seen that proposals for the remediation of the failure of education to promote the development of higher-order thinking are not lacking. Unfortunately, as Prawat (1991, p. 8) in his review of the research literature notes, "few studies to date have attempted to compare the relative effectiveness of different ways of promoting higher-order thinking in students."

We are currently in the process of conducting a study which uses each of the three approaches previously described to teach self-regulated learning strategies. The intent of the design has been to determine which approach (the stand alone, embedding, or immersion) best facilitates the development of higher-order, specifically self-regulating, thinking skills when employing a videodisc-based instructional system. It is our hunch that the immersion approach, by capitalizing on natural forms of learning when presented within the framework of the cognitive apprenticeship model, may prove the more powerful method of the three. Ultimately, based on the results of this and future studies, we hope to continue this line of inquiry by developing an intelligent tutoring system using interactive videodisc-based instruction designed to teach self-regulated learning strategies to college-age students.

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Appendix A
Dimensions of Self-Regulated Learning
A Working Model

General definition: (A) The ability to monitor, regulate, evaluate, sustain, and strategically modify, when necessary, the learning process and (B) sensitivity to, and ability to exercise control over, motivational and contextual factors that affect learning outcomes. The basic components of self-regulated learning include (1) epistemological beliefs (2) motivational processes (3) metacognitive processes (4) learning strategies (5) contextual sensitivity and (6) environmental control and/or utilization. Self-regulated learners are possessed of a belief system that views knowledge as complex and evolving, rather than simple and fixed, and the knower as capable of self-modification. An individual is a self-regulated learner to the degree that she/he is able to effectively monitor and regulate (control) and sustain the learning process, apply a variety of appropriate and efficient strategies to learning problems encountered, maintain a sense of competence, (intrinsic) motivation and personal agency, accurately diagnose the character and demands of particular learning challenges, and effectively utilize and control environmental factors that have a bearing on learning outcomes.

Six Dimensions of Self-Regulated Learning

A. *Epistemological Beliefs*: Defined as relatively enduring and unconscious beliefs about the nature of knowledge and the process of knowing.

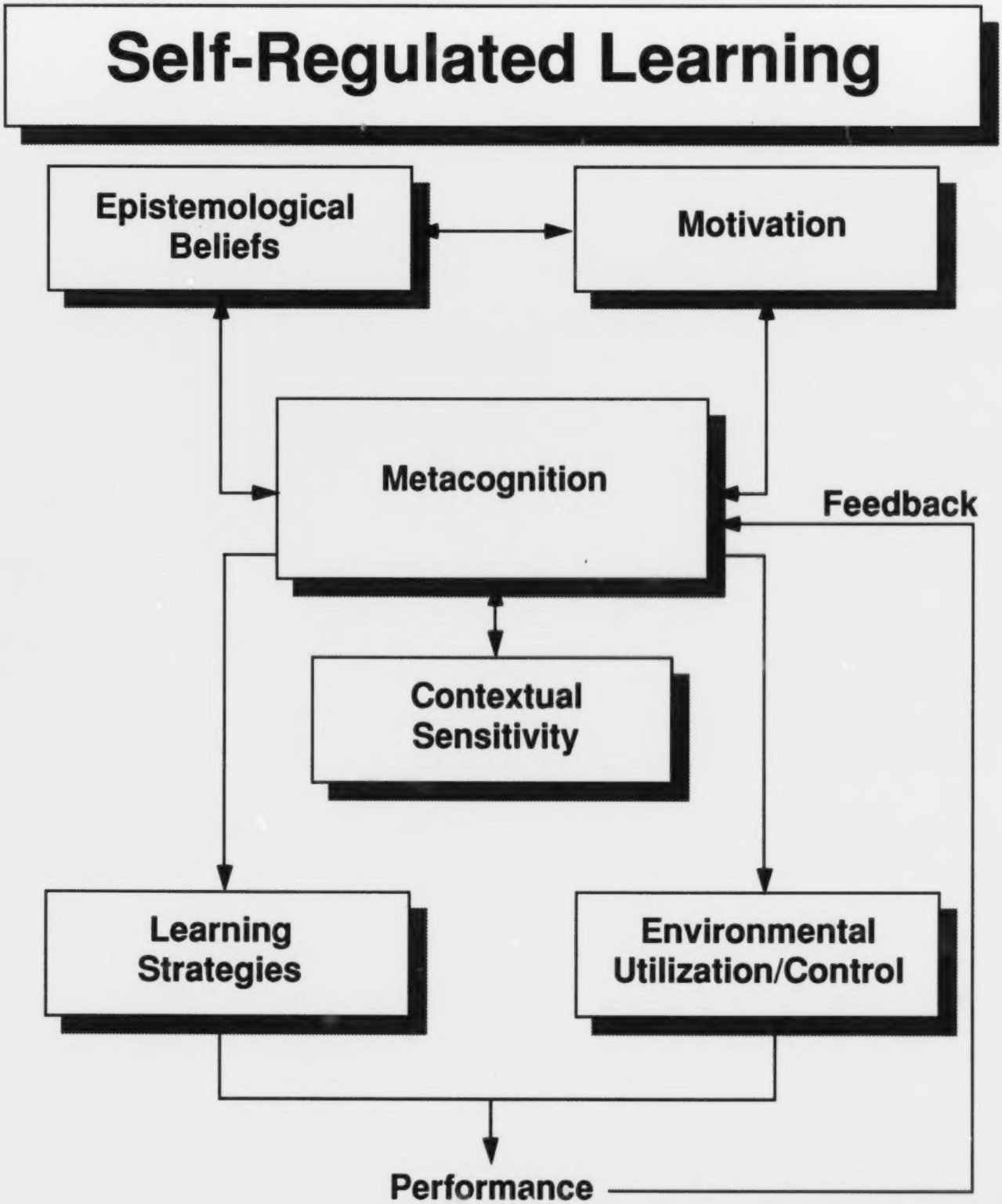
B. *Motivation*: Refers to goal-oriented effort that is a complex function of goal value, goal accessibility, perceived likelihood of success and one's sense of self-efficacy.

C. *Metacognition*: Defined generally as (1) knowledge about cognition and (2) awareness and conscious regulation of one's thinking and learning. The executive engine of cognition.

D. *Learning Strategies*: Refers to both operative knowledge of specific learning tactics (highlighting, summarizing, etc.) and the ability to combine various tactics into an effective learning plan.

E. *Contextual Sensitivity*: Refers to the ability to "read" the learning context for what it specifies regarding the demands of a particular problem setting and what it affords in the way of problem resolution.

F. *Environmental Utilization/Control*: Refers to the utilization and management of circumstances and resources external to the self in the pursuit of learning-related goals.


Self-Regulated Learning
Epistemological Beliefs
Motivation
Metacognition
Feedback
Contextual Sensitivity
Learning Strategies
Environmental Utilization/Control
Performance

Appendix B: Subscales of the Self-Regulated Learning Inventory with Sample Items

Sample Copy

SELF-REGULATED LEARNING INVENTORY 9/17/92

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Circle One

CLASS: F S Jr Sr Gr Other_____

SEX: M F

ETHNICITY: EA AA HA ASA NA Other_____

HIGH SCHOOL: U S R

GPA (on 4.0 scale): _____

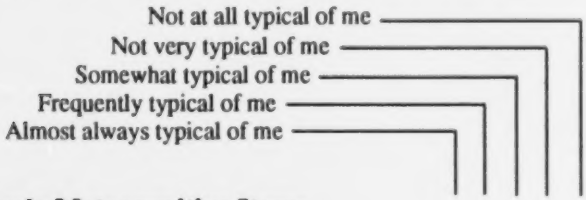
AGE: _____

TEL (last 4 digits): _____

INSTRUCTIONS: Please read each statement and then circle a response according to the following key:

a = Almost always typical of me
b = Frequently typical of me
c = Somewhat typical of me
d = Not very typical of me
e = Not at all typical of me

Respond as candidly and completely as possible by selecting the response most descriptive of your usual approach, and/or attitude, toward academic coursework. Try to rate yourself according to how well the statement describes you, not in terms of how you think you should be or what others think of you. There are no right or wrong answers. Your responses will be kept strictly confidential and are for research purposes only. Please complete all the items.


Not at all typical of me
Not very typical of me
Somewhat typical of me
Frequently typical of me
Almost always typical of me

Sample Metacognitive Items

1. After reading new information for a class, I mentally review it to get a sense of how much I have remembered. a b c d e

2. When studying, I make a mental note of concepts, terms or ideas I don't fully understand. a b c d e

Sample Learning Strategy Items

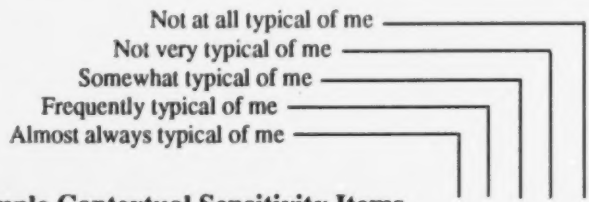
3. A study strategy I use to memorize a list of several things is to recite and rehearse the items until I can recall them from memory. a b c d e

4. When I have to learn unfamiliar concepts or ideas which are related, I use mental images to help tie them together. a b c d e

Sample Motivational Items

5. Mastery of new knowledge or skills is more important to me than how well I do compared to others. a b c d e

6. I find that if I don't expect to do well in a course, I become less motivated. a b c d e


Not at all typical of me
Not very typical of me
Somewhat typical of me
Frequently typical of me
Almost always typical of me

Sample Contextual Sensitivity Items

7. No matter what kind of exam I am preparing for, I always use the same study techniques. a b c d e

8. I adapt the study strategies I use based on the type and demands of a particular course. a b c d e

Sample Environmental Control Items

9. If I do not understand the material presented either in the text or lecture, I try to get help from someone who does. a b c d e

10. When studying, I isolate myself from anything that might distract me. a b c d e

Sample Epistemological Beliefs Items

11. Really smart students don't have to work hard to do well in school. SA A U D SD

12. If a person tries too hard to understand a problem, they will most likely just end up being confused. SA A U D SD